

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

JC903 U.S. PTO  
10/039956  
10/23/01

In the application of: M.K. Carpenter et al.

For: TECHNIQUES FOR GROWTH AND  
DIFFERENTIATION OF  
HUMAN PLURIPOTENT STEM CELLS

Filed Herewith

**INFORMATION DISCLOSURE STATEMENT**

**PURSUANT TO 37 CFR § 1.98(d)**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

The information listed in the accompanying form PTO-1449 may be material to examination of this application and are submitted in compliance with the duty of disclosure under 37 CFR § 1.56. The Examiner is requested to make this information of record in the application.

Copies of the information are not provided herewith, but are being filed in parent application 09/859,291, to which this application claims priority under 35 USC § 120. The Examiner is respectfully directed to the file for application 09/859,291 in order to access the information listed on the accompanying form PTO-1449. This is in compliance with the provisions of 37 CFR § 1.98(d).

This Information Disclosure Statement is not to be construed as a reputation that a full search for relevant information has been made, or that the information provided with this Statement is considered to be material to patentability of the claimed invention as defined under 37 CFR § 1.56(b).

Respectfully submitted,



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October 22, 2000.



Form 1449 (modified)

Docket: 091/009

U.S.S.N. To Be Assigned

## Information Disclosure

## Statement By Applicant

(Use Several Sheets, if Necessary)

Title: TECHNIQUES FOR GROWTH AND DIFFERENTIATION OF HUMAN PLURIPOTENT STEM CELLS  
 Inventors: Carpenter, M.K., et al.

Filing Date: Herewith

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## U.S. Patent Documents

Examiner Initial	Ref.	Patent No.	Filing Date	Issue Date	Class/ Subclass	Inventors:	Title:
	A	5,104,795	2/14/90	4/14/92	435/69.1	Lee, J-H., et al.	Shortened Phosphoglycerate Kinase Promoter
	B	5,166,065	3/31/90	11/24/92	435/240.1	Williams, R., et al.	In Vitro Propagation of Embryonic Stem Cells
	C	5,234,809	7/1/91	8/10/93	435/91	Boom, W., et al.	Process for isolating nucleic acid
	D	5,332,672	4/9/92	7/26/94	435/240.2	Conover, J., et al.	Prevention of ES Cell Differentiation by Ciliary Neurotrophic Factor
	E	5,405,772	6/18/93	4/11/95	435/240.31	Ponting, I.,	Medium For Long-Term Proliferation and Development of Cells
	F	5,453,357	10/8/92	9/26/95	435/7.21	Hogan, B.	Pluripotential embryonic stem cells and methods of making same
	G	5,523,226	5/14/93	6/4/96	435/240.2	Wheeler, M.	Transgenic Swine Compositions and Methods
	H	5,583,016	10/27/94	12/10/96	435/91.3	Villeponteau B, et al.	Mammalian Telomerase
	I	5,639,618	5/13/94	6/17/97	435/7.21	Gay, D.	Method of Isolating a Lineage Specific Stem Cell In Vitro
	J	5,643,761	10/27/93	7/1/97	435/91.1	Fisher, P., et al.	Method for Generating A Subtracted CDNA Library and Uses of the Generated Library
	K	5,672,499	6/7/95	9/30/97	435/240.4	Anderson, D., et al.	Immortalized Neural Crest Stem Cells and Methods of Making
	L	5,789,158	5/18/95	8/4/98	435/6	Knowles, B., et al.	Developmental Embryonic Mouse CDNA Libraries
	M	5,840,484	1/27/94	11/24/98	435/6	Seilhamer, J., et al.	Comparative Gene Transcript Analysis
	N	5,843,780	1/18/96	12/1/98	435/363	Thomson, J.	Primate embryonic stem cells
	O	5,856,136	7/3/96	1/5/99	435/69.3	Au-Young, J.	Human Stem Cell Antigens
	P	5,914,268	11/21/94	6/22/99	435/325	Keller, G., et al.	Embryonic Cell Populations and Methods to Isolate Such Populations
	Q	5,922,597	7/14/97	7/13/99	435/372.1	Verfaillie, C., et al.	Ex Vivo Culture of Stem Cells
	R	5,942,435	6/6/95	8/24/99	435/325	Wheeler, M.	Transgenic Swine Compositions and Methods
	S	5,968,829	9/5/97	10/19/99	435/467	Carpenter, M.	Human CNS Neural Stem Cells
	T	5,981,165	6/7/95	11/9/99	435/4	Weiss, S., et al.	In Vitro Induction of Dopaminergic Cells
	U	6,040,180	5/7/97	3/21/00	435/377	Johe, K.	In Vitro Generation of Differentiated Neurons From Cultures of Mammalian Multipotential CNS Stem Cells

Examiner	Date Considered

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Examiner Initial	Ref.	Patent No.	Filing Date	Issue Date	Class/ Subclass	Inventors:	Title:
	V	6,261,556	Oct 18/99	Jul 17/01	424/94.5	Weinrich SL et al.	Purified Telomerase

**Foreign Patent or Published Foreign Patent Application**

Examiner Initial	Ref.	Document No.	Publ. Date	Jurisdiction	Title:	Translation	
						Yes	No
	W	WO 94/07997	4/14/94	PCT	Long-term Proliferation of Primordial Germ Cells		
	X	WO 96/17627	6/13/96	PCT	System for the Maintenance, Growth and Differentiation of Human and Non-Human Primate Pluripotent Stem, Progenitor and Mature Bone Marrow Cells		
	Y	WO 97/21802	6/19/97	PCT	Novel Embryonic Cell Populations and Methods to Isolate Such Populations		
	Z	WO 97/28253	8/7/97	PCT	Method for Culturing Cells Having Angiogenic Potential	Abstract	X
	AA	WO 97/30151	8/21/97	PCT	Cytokine Expressed by Dia/Lif-Deficient Embryonic Stem Cells for the Inhibition of Differentiation		
	AB	WO 97/47734	12/18/97	PCT	In Vitro Derivation and Culture of Primate Pluripotent Stem Cells and Therapeutic Uses Thereof		
	AC	WO 98/00540	1/8/98	PCT	Human Stem Cell Antigens, DNA Coding Therefor and Their Use		
	AD	WO 98/30679	7/16/98	PCT	Embryonic Stem Cell Serum Replacement		
	AE	WO 98/43679	10/8/98	PCT	Human Embryonic Germ Cell Line and Methods of Use		
	AF	WO 99/01552	1/14/99	PCT	Fluorescent Proteins as Cell-Type Specific Reporter	Abstract	X
	AG	WO 99/10535	3/4/99	PCT	A Process to Study Changes in Gene Expression in Stem Cells		
	AH	WO 99/20741	4/29/99	PCT	Methods and Materials for the Growth of Primate-Derived Primordial Stem Cells		
	AI	WO 99/42122	8/26/99	PCT	Method of Promoting Embryonic Stem Cell Proliferation		
	AJ	WO 99/43785	9/2/99	PCT	Derivation of Cells and Tissues from Embryonic Pre-Stem Cells for Transplantation Therapies		
	AK	EP 0695 351 B1	12/8/99	EP	Isolation, Selection and Propagation of Animal Transgenic Stem Cells		
	AL	FR 2744133	8/1/97	FR	Procedure for Culturing Cells with Morphogenic Potential for Inducing Morphogenesis of the Aforesaid Cells, Models in Vitro of Vascular Morphogenesis thus Obtained, and their Modification for Drug Screening Derwent Summary of WO 97/28253 and FR 2744133	Summary	X

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**Other Documents**

Examiner Initial	Ref.	Author, Title, Date, Source
	AM	Amit, M., et al., "Clonally Derived Human Embryonic Stem Cell Lines Maintain Pluripotency and Proliferative Potential for Prolonged Periods of Culture," Dev. Biology, 227:000-000 (2000)
	AN	Andrews, P., "Retinoic Acid Induces Neuronal Differentiation of a Cloned Human Embryonal Carcinoma Cell Line in Vitro," Dev. Biol., 103:285 (1984)
	AO	Baribault, H., et al., "Embryonic Stem Cell Culture and Gene Targeting in Transgenic Mice," Mol. Biol. Med. 6:481 (1989)
	AP	Becton Dickinson, "Product Specification Sheet : Matrigel Basement Membrane Matrix, Phenol-Red Free"
	AQ	Berger, C., et al., "Self Renewal of Embryonic Stem Cells in the Absence of Feeder Cells and Exogenous Leukaemia Inhibitory Factor," Growth Factors, 14:145 (1997)
	AR	Bodnar, A., et al., "Extension of Life-Span by Introduction of Telomerase into Normal Human Cells," Science, 279:349 (1998)
	AS	Bongso, A., et al., "Improved Quality of Human Embryos When Co-Cultured with Human Ampullary Cells," Hum. Reprod., 4:706 (1989)
	AT	Bradley, A., et al., "Modifying the Mouse: Design and Desire," Biotechnology, 10:534 (1992)
	AU	Brook, F., et al., "The Origin and Efficient Derivation of Embryonic Stem Cells in the Mouse," Proc. Natl. Acad. Sci., 94:5709 (1997)
	AV	Carnegie, J., "Immunolocalization of Fibronectin and Laminin Within Rat Blastocysts Cultured Under Serum-Free Conditions," J. Reprod. Fert., 91:423 (1991)
	AW	Caminci, P., et al., "High-Efficiency Full-Length cDNA Cloning," Methods Enzymol., 303:19 (1999)
	AX	Clontech Laboratories, SMART cDNA Library Construction Kit, Catalog #K1051-1
	AY	Corrick, C., et al., "Construction of a Mouse Blastocyst cDNA Library by PCR Amplification From Total RNA," Molecular Reproduction and Development, 43:7 (1996)
	AZ	Deleersnijder, W., et al., "Isolation of markers for chondro-osteogenic differentiation using cDNA library subtraction. Molecular cloning and characterization of a gene belonging to a novel multigene family of integral membrane proteins", J Biol Chem, 271:19475 (1996)
	BA	Eisen, M., "Cluster Analysis and Display of Genome-wide Expression Patterns," Proc. Natl. Acad. Sci., 95:14868 (1998)
	BB	Elges, R., et al., "Establishment of Human Embryonic Stem Cell-Transfected Clones Carrying a Marker for Undifferentiated Cells," Curr Biol, 11:514 (2001)
	BC	Evans, M., et al., "Establishment in Culture of Pluripotential Cell from Mouse Embryos," Nature, 292:154 (1981)
	BD	Fenderson, B., et al., "Carbohydrate Antigens of Embryonal Carcinoma Cells: Changes Upon Differentiation," APMIS Suppl. 27, 100:109 (1992)
	BE	Finley, M., et al., "Synapse Formation and Establishment of Neuronal Polarity by P19 Embryonic Carcinoma Cells and Embryonic Stem Cells," J. Neuroscience, 16:1056 (1996)
	BF	Gardner, D., et al., "Culture and Transfer of Human Blastocysts Increases Implantation Rates and Reduces the Need for Multiple Embryo Transfers," Fertil. Steril, 69:84 (1998)
	BG	Gendall, A., et al., "Isolation and Characterization of a Leukemia Inhibitory Factor-Independent Embryonic Stem Cell Line," Int. J. Biochem Cell Biol., 29:829 (1997)
	BH	Gendron, R., et al., "Induction of Embryonic Vasculogenesis by bFGF and LIF in Vitro and in Vivo," Developmental Biology, 177:332 (1996)

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Examiner Initial	Ref.	Author, Title, Date, Source
	BI	GibcoBrl Life Technologies Catalogue and Ref. Guide, pages 1-2 through 1-4, 1-94 and 1-95 (1993)
	BJ	Itoh, M., et al., "Automated Filtration-Based High-Throughput Plasmid Preparation System," Genome Res., 9:463 (1999)
	BK	Itskovitz-Eldor, J., et al., "Differentiation of Human Embryonic Stem Cells into Embryoid Bodies Comprising the Three Embryonic Germ Layers," Mol. Med., 6:88 (2000)
	BL	Keller, G., "In Vitro Differentiation of Embryonic Stem Cells," Cell Biology, 7:862 (1995)
	BM	Kelly, DL., et al., "DNA Microarray Analyses of Genes Regulated During the Differentiation of Embryonic Stem Cells," Mol Reprod. Dev., 56:113 (2000)
	BN	Ko, M., et al., "Large-scale cDNA analysis Reveals Phased Gene Expression Patterns During Preimplantation Mouse Development," Development, 127:1737 (2000)
	BO	Koshimizu, U., et al., "Functional Requirement of gp130-mediated Signaling for Growth and Survival of Mouse Primordial Germ Cells In Vitro and Derivation of Embryonic Germ (EG) Cells," Development, 122:1235 (1996)
	BP	Koshimizu, U., et al., "Rapid Communication Retinoic Acid Is a Potent Growth Activator of Mouse Primordial Germ Cells in Vitro," Developmental Biology, 168:683 (1995)
	BQ	Life Technologies, Inc., "SuperScript II; Rnase H Reverse Transcriptase," Product Brochure; pages 1-4
	BR	Matsuda, T., et al., "STAT3 Activation is Sufficient to Maintain an Undifferentiated State of Mouse Embryonic Stem Cells," EMBO J., 18:4261 (1999)
	BS	Matsui, Y., et al., "Derivation of Pluripotential Embryonic Stem Cells from Murine Primordial Germ Cells in Culture," Cell, 70:841 (1992)
	BT	Nichols, J., et al., "Establishment of Germ-line-Competent Embryonic Stem (ES) Cells Using Differentiation Inhibiting Activity," Development, 110:1341 (1990)
	BU	Nichols, J., et al., "Derivation of Germline Competent Embryonic Stem Cells with a Combination of Interleukin-6 and Soluble Interleukin-6 Receptor," Experimental Cell Research, 215:237 (1994)
	BV	O'Shea, K., "Embryonic Stem Cell Models of Development," New Anat., 257:32 (1999)
	BW	Pease, S., et al., "Isolation of Embryonic Stem (ES) Cells in Media Supplemented with Recombinant Leukemia Inhibitory Factor (LIF)," Developmental Biology, 141:344 (1990)
	BX	Pera, M., "Human Pluripotent Stem Cells: a Progress Report," Curr Opin Genet Dev, 11:595 (2001)
	BY	Pedersen, R., "Studies of In Vitro Differentiation with Embryonic Stem Cells," Reprod. Fertil. Dev., 6:543 (1994)
	BZ	Pedersen, R., "Embryonic Stem Cell for Medicine," Scientif. Am., 280:68 (1999)
	CA	Rathjen, J., et al., "Formation of a Primitive Ectoderm Like Cell Population, EPL Cells, from ES Cells in Response to Biologically Derived Factors," J. of Cell Sci., 112:601 (1999)
	CB	Rehman, N., et al., "Development of IVM-IVF Produced 8-Cell Bovine Embryos in Simple, Serum-Free Media After Conditioning or Co-Culture With Buffalo Rat Liver Cells," Mol. Repro. Dev, 38:251 (1994)
	CC	Reubinoff, B., et al., "Embryonic Stem Cell Lines From Human Blastocysts: Somatic Differentiation In Vitro," Nat. Biotechnology, 18:399 (2000)
	CD	Robertson, E., "Derivation and Maintenance of Embryonic Stem Cell Cultures," Methods in Mol. Bio., 75:173 (1997)
	CE	Rose, T., et al., "Oncostatin M (OSM) Inhibits the Differentiation of Pluripotent Embryonic Stem Cells In Vitro," Cytokine, 6:48 (1994)

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	CF	Shamblott, M., et al., "Human Embryonic Germ Cell Derivatives Express a Broad Range of Developmentally Distinct Markers and Proliferate Extensively in Vitro," PNAS, 98: 118 (2001)
	CG	Shamblott, M., et al., "Derivation of Pluripotent Stem Cells from Cultured Human Primordial Germ Cells," Proc. Natl. Acad. Sci. USA, 95:13726 (1998)
	CH	Smith, A., et al., "Inhibition of Pluripotential Embryonic Stem Cell Differentiation by Purified Polypeptides," Nature, 336:668 (1998)
	CI	Smith, A., et al., "Buffalo Rat Liver Cells Produce a Diffusible Activity Which Inhibits the Differentiation of Murine Embryonal Carcinoma and Embryonic Stem Cells," Dev. Biol., 121:1 (1987)
	CJ	Sigma, Product Information for Laminins for Cell Culture
	CK	Takahashi, N., et al., "Toward a Whole cDNA Catalog: Construction of an Equalized cDNA library from Mouse Embryos," Genomics, 23:202 (1994)
	CL	Thomson, J., et al., "Embryonic Stem Cell Lines Derived from Human Blastocysts," Science, 282:145 (1998)
	CM	Thomson, J., et al., "Neural Differentiation of Rhesus Embryonic Stem Cells," APMIS, 106:149 (1998)
	CN	Thomson, J., et al., "Isolation of a Primate Embryonic Stem Cell Line," Proc. Natl. Acad. Sci. USA, 92:7844 (1995)
	CO	Thomson, J., et al., "Primate Embryonic Stem Cells," Current Topics in Developmental Biology, 38:133 (1998)
	CP	Vassilieva, S., et al., "Establishment of SSEA-1- and Oct-4-Expressing Rat Embryonic Stem-like Cell Lines and Effects of Cytokines of the IL-6 Family on Clonal Growth," Exper. Cell Research, 258:361 (2000)
	CQ	Worrall, D., et al., "A Carrot Leucine-Rich-Repeat Protein That Inhibits Ice Recrystallization," Science, 282:115 (1998)
	CR	Wenk, J., et al., "Glycolipids of Germ Cell Tumors: Extended Globo-Series Glycolipids are a Hallmark of Human Embryonal Carcinoma Cells," Int. J. Cancer, 58:108 (1994)
	CS	Williams, R., et al., "Myeloid Leukaemia Inhibitory Factor Maintains the Developmental Potential of Embryonic Stem Cells," Nature, 336:684 (1988)
	CT	Woltjen, K., et al., "Retro-recombination Screening of a Mouse Embryonic Stem Cell Genomic Library," Nucleic Acids Research, 28:e41 (2000)
	CU	Xiong, J., et al., "Large-Scale Screening for Developmental Genes in Embryonic Stem Cells and Embryoid Bodies Using Retroviral Entrapment Vectors," Dev. Dynamics, 212:181 (1998)
	CV	Zandstra, P., et al., "Leukemia Inhibitory Factor (LIF) Concentration Modulates Embryonic Stem Cell Self-Renewal and Differentiation independently of Proliferation," Biotechnol. Bioeng., 69:607 (2000)

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